

# PATENT ABSTRACTS OF JAPAN

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## (54) FLAT CABLE COATING MATERIAL AND FLAT CABLE USING THE SAME

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide environmental friendly flat cable coating material and flat cable without using halogen based flame retarder and antimony based fire retarder.

**SOLUTION:** In a flat cable coating material having heat adhesive layer layered on one surface of a base film, the heat adhesive layer is composed of at least synthetic resin having heat seal property and flame retarder. The flame retarder is composed of main flame retarder of melamine derivative and sub flame retarder of metal hydrate chemical compound and/or metal oxide chemical compound and/or nonhalogen organic phosphate chemical compound. And also, the flame retarder contains at least one type of melamine derivative, and/or at least one kind of metal hydrate chemical compound, and/or at least one kind of metal oxide chemical compound, and/or at least one kind of metal oxide chemical nonhalogen organic phosphate chemical compound.



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CLAIMS

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[Claim(s)]

[Claim 1] In the flat cable covering material which carried out the laminating of the heat glue line to one field of a base material film at least Said heat glue line consists of synthetic resin which has heat-sealing nature, and a flame retarder. It consists of a fire-resistant assistant of the main flame retarder which this flame retarder turns into from a melamine derivative and hydration metallic compounds, a metal oxide compound, and/or a non-halogen organic phosphorous compound. A flame retarder further again At least one sort of melamine derivatives, and/ Or flat cable covering material characterized by consisting of at least one sort of hydration metallic compounds, at least one sort of metal oxide compounds, and/or at least one sort of non-halogen organic phosphorous compounds.

[Claim 2] Flat cable covering material according to claim 1 with which the synthetic-resin component of a heat glue line consists of a constituent with which 20 - 50 % of the weight and a flame-retarder component contain 50 - 80 % of the weight, and content of a melamine derivative is characterized by the content of 50 - 80 % of the weight and hydration metallic compounds being [ the content of 10 - 40 % of the weight and a non-halogen organic phosphorous compound ] 10 - 30 % of the weight for this flame-retarder component further again.

[Claim 3] from the constituent with which 20 - 50 % of the weight and a flame-retarder component contain [ the synthetic-resin component of a heat glue line ] 50 - 80 % of the weight -- becoming -- further -- again - - the flat cable covering material according to claim 3 with which content of hydration metallic compounds is characterized [ this flame-retarder component ] by \*\*\*\* by the content of a melamine derivative at 10 - 50 % of the weight 50 to 90% of the weight.

[Claim 4] from the constituent with which 20 - 50 % of the weight and a flame-retarder component contain [ the synthetic-resin component of a heat glue line ] 50 - 80 % of the weight -- becoming -- further -- again - - the flat cable covering material according to claim 3 with which content of a metal oxide compound is characterized [ this flame-retarder component ] by \*\*\*\* by the content of a melamine derivative at 5 - 30 % of the weight 70 to 95% of the weight.

[Claim 5] Claim 3 characterized by not containing phosphorus compounds for a flame-retarder component, and flat cable covering material according to claim 4.

[Claim 6] In the flat cable which comes to cover a train with flat cable covering material from both sides the conductor which arranged two or more conductors in the same flat surface -- In the flat cable covering material with which the flat cable covering material of at least one side carried out the laminating of the heat glue line to one field of a base material film at least Said heat glue line consists of synthetic resin which has heat-sealing nature, and a flame retarder. It consists of a fire-resistant assistant of the main flame retarder which this flame retarder turns into from a melamine derivative and hydration metallic compounds, a metal oxide compound, and/or a non-halogen organic phosphorous compound. It is characterized by a flame retarder consisting of at least one sort of melamine derivatives, at least one sort of hydration metallic compounds, at least one sort of metal oxide compounds, and/or at least one sort of non-halogen organic phosphorous compounds further again.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the flat cable covering material of the flat cable used for the electrical machinery and apparatus which was excellent in adhesion with a conductor, and possesses fire retardancy and environmental fitness, electronic equipment, others, etc., and the flat cable using it in more detail about flat cable covering material.

[0002]

[Description of the Prior Art] Conventionally, by electronic equipment, such as OA equipment and a game machine, the flat cable for electric connection of a computer, electronic parts, etc. or various wiring is used. A flat cable has the inside of the narrow case of this electronic equipment taken about, and it slides with migration of electronic parts, and it is used under the hot environment accompanying generation of heat of electronic parts. For this reason, flexibility [ as opposed to sliding in the flat cable covering material which has covered the flat cable ], the thermal resistance to an elevated temperature, and fire retardancy are required. Furthermore, in the abolition processing after an activity, it may also become the ringleader of environmental destruction.

[0003] The fire-resistant hot glue of a non halogen system with which the fire-resistant flat cable of the non halogen by the adhesive layer in which the fire-resistant flat cable of the non halogen by the glue line which consists of a polyimide film and a Lynn denaturation saturated polyester copolymer contains thermoplastic polyester resin and a phosphorus series flame retardant by JP,8-60108,A consists of polyester system resin, a polyphosphoric acid system flame retarder, and a non-polyphosphoric acid system nitrogen content organic flame retarder by JP,9-221642,A and JP,9-279101,A is known for JP,2001-89736,A.

[0004] However, if the polyester system film or the polyimide system film is used for the base material film of a flat cable and a polyester system film is independent as for all, fire retardancy runs short, and there is a problem that a price is expensive, with a polyimide system film. Moreover, in the flat cable covering material which uses the flame retarder of an antimony system for the glue line (there is also an official report currently expressed as the adhesive layer), after the flat cable which used this flat cable covering material is discarded after an activity with electronic equipment, the fault that a flame retarder is revealed to an environment by a certain factor, or there is a possibility of it being incorporated by the body and injuring health is.

[0005] In order to protect an environment on earth level in recent years, harmful matter tends to carry out activity regulation, and should avoid the activity of harmful matter as much as possible also about the ingredient used for a flat cable. For example, the decabromodiphenyl ether (DBDPO) which is a bromine system flame retarder has a possibility that a dioxin related substance may generate depending on combustion conditions, and the activity regulation is desired. Moreover, it is said that antimony has carcinogenic fear.

[0006]

[Problem(s) to be Solved by the Invention] Then, that such a trouble should be canceled, this invention hits on an idea of using a non-halogen system and a non-antimony system flame retarder for a base material film with flexibility, and a heat glue line, and results in completion of this invention.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the summary of the 1st invention In the flat cable covering material which carried out the laminating of the heat glue line to one field of a base material film at least Said heat glue line consists of synthetic resin which has heat-sealing nature, and a flame retarder. It consists of a fire-resistant assistant of the main flame retarder which this

flame retarder turns into from a melamine derivative and hydration metallic compounds, a metal oxide compound, and/or a non-halogen organic phosphorous compound. A flame retarder further again At least one sort of melamine derivatives, and/ Or at least one sort of hydration metallic compounds, at least one sort of metal oxide compounds, and/or at least one sort of non-halogen organic phosphorous compounds were made to contain, and the 2nd invention removed the non-halogen organic phosphorous compound from the heat glue line of said 1st invention. the conductor with which the 3rd invention arranged two or more conductors in the same flat surface using the above-mentioned flat cable covering material -- let the flat cable which comes to cover a train from both sides be a summary.

[0008]

[Embodiment of the Invention] The embodiment of this invention is explained to a detail using a drawing. Drawing 1 is the typical sectional view showing the configuration of one example of the flat cable covering material of this invention. The laminating of the flat cable covering material 10 of this invention is carried out to this order one by one in the primer layer 12 and the heat glue line 13 in one field of the base material film 11. As a base material film 11, it excels in a mechanical strength. Thermal resistance, chemical resistance, The polyethylene terephthalate which is rich in solvent resistance, flexibility, insulation, etc., Polyester system films, such as polyethylenenaphthalate and polybutylene terephthalate, Polyamide system films, such as nylon 6, Nylon 66, and Nylon 610, Polyimide system films, such as polyimide, polyamidoimide, and polyether imide, A fluorine system film, polyether sulfone, a polyether ketone, polyether sulfide, polyarylate, the polyester ether, all aromatic polyamide, polyaramide, a polypropylene film, a polycarbonate film, etc. are applicable. Usually, polyalkylene terephthalate, such as polyethylene terephthalate and polyethylenenaphthalate, is used suitably.

[0009] This base material film has a desirable oriented film in order to be able to apply an unstretched film or an oriented film and to raise reinforcement, and the film extended to 1 shaft orientations or 2 shaft orientations is suitable for especially a biaxially oriented film. Moreover, the front face of a base material film may perform corona treatment, plasma treatment, ozonization, and other pretreatments if needed. The thickness of this base material film can usually apply 5 micrometers - 200 micrometers, and 10 micrometers - 100 micrometers are suitable for it. The fitness which mechanical strengths run short that thickness is less than 5 micrometers, and is formed [ glue line / 13 / the primer layer 12, / heat ] decreases. Good flexibility can be given to this flat cable covering material 10 while being able to give the reinforcement needed for the flat cable covering material 10 of this invention by making it such thickness, since flexibility runs short of thickness by 200 micrometers or more and sliding nature gets worse.

[0010] Subsequently, the primer layer 12 is applied to the base material film 11 if needed. This primer layer 12 is for pasting up hot glue 13 on the base material film 11 firmly, and it being equal to sliding at the time of the activity to electronic equipment, controlling exfoliation between layers etc., and improving insulation and endurance. As an ingredient of the primer layer 12, the multifunctional compound which has an isocyanate radical, a block isocyanate radical, and/or a carbodiimide radical, and the primer agent in which a glass transition point contains preferably 20 degrees C - 120 degrees C of 30 degrees C - 100 degrees C polyester system resin and polyurethane system resin are applicable, for example.

[0011] Moreover, as a primer agent, the so-called anchor coat agent which uses a polyethyleneimine system compound, an organic titanium system compound, an isocyanate system compound, an urethane system compound, a poly-butadiene system compound, etc. as a principal component is also applicable.

[0012] Contraction the compounding ratio of the above-mentioned polyester system resin and polyurethane system resin is weight criteria, and about polyester system resin / polyurethane system resin = 0.7 / 0.3 to 0.3/0.7 are desirable, and according to the heat of a heat glue line is prevented. Moreover, the addition of a multifunctional compound has the desirable amount which is equivalent to a 1 to 10 times as many reaction radical as this to the reaction radical of a polyester system and polyurethane system resin. It is diluted and used by the organic solvent so that it may become 2 - 60% of the weight by making these primer agents into solid content.

[0013] The diluent of this primer agent is applied by the approach of a roll coat, a reverse roll coat, a gravure coat, a reverse gravure coat, a bar coat, RODDOKO-TO, a kiss coat, a knife coat, a die coat, a comma coat, a flow coat, a spray coat, etc., it dries, a solvent is removed, and the primer layer 12 is made to form. If it requires, it will age at the temperature of 30 degrees C - 70 degrees C. 0.05 micrometers - about 10 micrometers of thickness of the primer layer 12 are usually 0.1 micrometers - about 5 micrometers preferably.

[0014] The thermoplastic polyester system resin which 20 degrees C - the 120 degrees C of the above-mentioned glass transition points generate [ as 30 degrees C - 100 degrees C polyester system resin ]

preferably by the condensation polymerization of a kind of aromatic series saturation dicarboxylic acid, such as a terephthalic acid, or plurality, and a kind of saturation dihydric alcohol or plurality, for example is applicable. Moreover, as polyurethane system resin, the polyurethane system resin generated at the reaction of polyfunctional isocyanate and a hydroxyl content compound is applicable, for example.

[0015] As a multifunctional compound, it is the multifunctional compound which has an isocyanate radical, a block isocyanate radical, and/or a carbodiimide radical. For example, 2, 4-tolylene diisocyanate, 2, 6-tolylene diisocyanate, Diphenylmethane -4, 4'-diisocyanate, xylenediisocyanate, Polyfunctional isocyanates, such as isophorone diisocyanate, polymethylene polyphenyl diisocyanate, and hexamethylene di-isocyanate, The block-type isocyanate which carried out the mask of the polyol denaturation object of these isocyanate, carbodiimide denaturation objects, and such isocyanates by alcohol, the phenol, the lactam, the amine, etc. is applicable.

[0016] Subsequently, the heat glue line 13 is formed in the primer layer 12. The heat glue line 13 needs to be rich in flexibility and to have the primer layer 12 and heat-sealing nature with a conductor. It needs to embed a conductor into it, without generating an opening while this heat glue line's 13 being able to make conductors, such as a metal, pinch between the layer, and softening by heating application of pressure by the heating roller or the hot plate, fusing it, and carrying out thermal melting arrival mutually firmly and being excellent in adhesion with a conductor.

[0017] This heat glue line consists of a constituent with which 20 - 50 % of the weight and a flame-retarder component contain [ a synthetic-resin component ] 50 - 80 % of the weight. Although it is so good that there are many flame-retarder components, if there are many flame retarders, in case a synthetic-resin component will decrease and formation processing of the heat glue line will be carried out, membranes cannot be formed, and required adhesive ability is not obtained from the fire-resistant engine performance. There is fire retardancy and 50 - 80 % of the weight is suitable for 20 - 50 % of the weight, and a flame-retarder component for a synthetic-resin component as a good presentation of workability.

[0018] As an ingredient which constitutes the heat glue line 13, ionomer resin, acid denaturation polyolefine system resin, an ethylene-(meta) acrylic-acid copolymer, an ethylene-(meta) acrylic ester copolymer, polyester system resin, polyamide system resin, polyurethane system resin, acrylic (meta) resin, polyvinyl ether resin, silicone resin, rubber system resin, etc. are applicable, for example.

[0019] As resin of the heat glue line 13, polyester system resin can be suitably used from the ease of carrying out of mixing of heat-sealing nature with a conductor, and a flame retarder. What consists of a resin constituent with which it is saturation copolymerized polyester resin, and a glass transition point is -50 degrees C - 80 degrees C, and weight average molecular weight uses the resin of the range of 7000-50000 as a principal component is suitable for this polyester system resin. Moreover, a glass transition point may blend and use the polyester system resin which is comparatively low rich in flexibility, and the polyester system resin of a glass transition point which is comparatively highly rich in thermal resistance. Furthermore, the polyester system resin of amorphism nature and crystalline polyester system resin may be used, blending them suitably.

[0020] As a flame retarder made to contain to the heat glue line 13, a flame retarder of a non-halogen system and a non-antimony system is desired. At least one sort of melamine derivatives, at least one sort of hydration metallic compounds, at least one sort of metal oxide compounds, and/or at least one sort of non-halogen organic phosphorous compounds are made to contain as this flame retarder.

[0021] The melamine derivative which is one of the flame retarders can apply melamine derivatives, such as a melamine and triazine, isocyanurate, and guanamine. It is a non halogen series flame retardant, and sulfuric-acid amino triazine compounds, such as melamine resin, a sulfuric-acid melamine, sulfuric-acid acetoguanamine and a sulfuric-acid guanyl melamine, sulfuric-acid MEREMU, and sulfuric-acid MERAMU, a melamine (cyanurtriamide), AMUMERIN (cyanuric acid diamide), AMUMERIDO (cyanuric acid monoamide), MERAMU, a melamine SHIANU rate (condensation of a melamine and cyanuric acid), gay guanamine, benzoguanamine, acetoguanamine, etc. can be applied as this melamine and a melamine derivative. It is points, such as dispersibility to polyester system resin, miscibility, and an adhesive property, and a sulfuric-acid amino triazine compound and a melamine SHIANU rate are suitable. These melamine derivatives may be used independently or may use two or more sorts together.

[0022] Moreover, by this invention, effectiveness was found out more by combining a flame retarder if needed. As this flame retarder, hydration metallic compounds, a metal oxide compound, and a non-halogen organic phosphorous compound are applicable, and it may be independent or you may use it combining two or more sorts. If there are few loadings of this flame retarder, the fire-resistant improvement effectiveness will not be acquired, but if many [ too ], the formation workability of the heat glue line 13 will fall.

Therefore, it is very important to set the class of flame retarder used for the heat glue line 13, combination, and its compounding ratio as a proper value.

[0023] First, as hydration metallic compounds, although an aluminum hydroxide, a magnesium hydroxide, zirconium hydroxide, a calcium hydroxide, hydroxylation titanium, zinc hydroxide, etc. are applicable, it excels in fire retardancy and an advantageous aluminum hydroxide and a magnesium hydroxide are suitable also in respect of cost. Even if these hydration metallic compounds are independent, combination can also be used for them for two or more sorts. As a gold oxide group compound, stannic-acid zinc, a molybdenum oxide acid, boric-acid zinc, the tin oxide, molybdenum oxide, boron oxide, a silicon dioxide, etc. are applicable, for example. However, an antimony oxide system also has an environmental problem and is not used as a metallic oxide of this invention.

[0024] As a non-halogen organic phosphorous compound used as a flame retarder of this invention, a non-halogen phosphoric ester monomer, a non-halogen phosphoric ester condensation product, and phosphate are applicable. As a non-halogen phosphoric ester monomer, there are triphenyl phosphate (TPP), tricresyl phosphate (TCP), trixylenyl phosphate, triethyl phosphate, cresyl diphenyl phosphate, xylenyl diphenyl phosphate, cresyl (JI 2, 6 xylenyl) phosphate, 2-ethylhexyl diphenyl phosphate, dimethyl methyl phosphate, etc. As a non-halogen phosphoric ester condensation product, there are resorcinol (diphenyl) phosphate, resorcinol screw (JI 2, 6 xylenyl) phosphate, bisphenol A screw (diphenyl) phosphate, bisphenol A screw (JIKUREJIRU) phosphate, etc. . As phosphate, there are Diethyl N, N-screw (2-hydroxyethyl) amino phosphate, etc.

[0025] Especially, fire-resistant high triphenyl phosphate (TPP), tricresyl phosphate (TCP), etc. are suitable. Since physical properties, such as adhesion, will fall if many [ if there are few loadings of the flame retarder of the above-mentioned non-halogen organic phosphorous compound, sufficient fire retardancy cannot be demonstrated, and / too ], the content used into a glue line has desirable 10 - 30 weight section. Even if these are used independently, two or more sorts may be used together.

[0026] In the heat glue line 13 containing the non-halogen system of this invention, and a non-antimony system flame retarder, it is the range which does not have effect in the effectiveness of this invention, and further various additives, for example, an anti-oxidant, a metallic corrosion inhibitor, a coloring agent (a pigment, color), an antiblocking agent, the various coupling agents that raise the cohesive force between resin and a flame retarder, a cross linking agent, a bridge formation assistant, a bulking agent, an antistatic agent, and a fire-resistant catalyst may be added suitably. As magnitude of the particle of the above-mentioned inorganic flame retardant, they are about 0.01micro thru/or about 15micro as a primary particle.

[0027] For example, extenders, such as a calcium carbonate, a barium sulfate, a magnesium carbonate, an aluminum oxide, titanium oxide, and a zinc oxide, or white pigments, the powder of other inorganic compounds, a glass frit, fluororesin powder, polyolefine system resin powder, others, etc. can be used. In addition, in this invention, in an above-mentioned extender or white pigments, since the particle diameter is small as compared with things, such as a magnesium carbonate and an aluminum oxide, things, such as titanium oxide or a zinc oxide, have the advantage of also doing so the function as an antiblocking agent of a under [ an inventory ] for flat cable covering material with a roll-like product gestalt.

[0028] Next, make into a principal component a kind of resin which is rich in the above flexibility and has heat-sealing nature in this invention thru/or more than it, and it is contained. Furthermore, add a kind of the above flame retarders, or more than it, add the curing agent suitable for the further above-mentioned resin, and if still more nearly required Other additives are added to arbitration, for example, in solvents, such as toluene, ethyl acetate, alcohols, and a methyl ethyl ketone, a diluent, etc., it fully kneads, solubilizes or decentralizes, and a resin constituent is manufactured. <BR> [0029] Subsequently, this resin constituent is used, it can apply and dry by coating methods, such as a roll coat, a reverse roll coat, a gravure coat, a reverse gravure coat, a bar coat, RODDOKO-TO, a kiss coat, a knife coat, a die coat, a comma coat, a flow coat, and a spray coat, and the heat glue line 13 of the heat-sealing nature containing the flame retarder of 15-150-micrometer (at time of desiccation) extent in thickness can be formed for this.

[0030] In this invention of claim 2, the synthetic-resin component of a heat glue line consists of a constituent with which 20 - 50 % of the weight and a flame-retarder component contain 50 - 80 % of the weight, and the content of 10 - 40 % of the weight and a non-halogen organic phosphorous compound takes [ this flame-retarder component / the content of a melamine derivative / the content of hydration metallic compounds ] further again for 10 - 30 % of the weight 50 to 80% of the weight. By this invention of claim 3, by the case where a non-halogen organic phosphorous compound is not contained in a heat glue line, the synthetic-resin component of a heat glue line consists of a constituent with which 20 - 50 % of the weight and a flame-retarder component contain 50 - 80 % of the weight, and the content of hydration metallic

compounds may be [ this flame-retarder component / the content of a melamine derivative ] 10 - 50 % of the weight 50 to 90% of the weight further again. 20 - 50 % of the weight and a flame-retarder component consist of a constituent with which the synthetic-resin component of a heat glue line contains 50 - 80 % of the weight by the case where a non-halogen organic phosphorous compound is not contained in a heat glue line, and presuppose further again that the content of a metal oxide compound also considers [ this flame-retarder component / the content of a melamine derivative ] this invention of claim 4 as 5 - 20 % of the weight 70 to 95% of the weight. If many [ any case of fire retardancy is inadequate if there are few contents of this flame-retarder component, and / too ], processing suitability and adhesive ability will not come out. An example explains the construction material of this flame retarder, combination, and a content to a detail. [0031] Drawing 2 is the typical sectional view showing the configuration of one example of the flat cable of this invention. Drawing 3 is AA sectional view of drawing 2. the conductor with which the flat cable 1 of this invention arranged two or more conductors 21 in the same flat surface -- the train is covered with flat cable covering material 10 from both sides. the flat cable covering material 10 explained so far in this invention -- using it -- at least one of the two -- this covering material 10 for flat cables of two sheets is preferably countered in the 13th page of the heat glue line -- making -- superposition and the conductor which arranged the conductors 21, such as two or more metals, in the same flat surface between the layer further -- a train is made to intervene

[0032] By carrying out heating application of pressure and heat sealing this covering material 10 for flat cables, and a conductor 21 after an appropriate time, close arrival of the heat glue line 13 and conductor 21 of heat-sealing nature which constitute this covering material 10 for flat cables is carried out, and heat glue line 13 self which countered is also pasted up further mutually. Thus, the flat cable covering material 10 and the conductor 21 of two sheets which countered can carry out close arrival, and the flat cable 1 which the conductor 21 was embedded to the heat glue line 13, and unified can be manufactured.

[0033]

[Example] Although an example and the example of a comparison are given and this invention is explained concretely hereafter, this invention is not limited only to these examples.

(Example 1) Using polyethylene terephthalate (the Teijin E. I. du Pont de Nemours film company make, GEC-23) with a thickness of 23 micrometers as a base material film 11, in the comma coating machine, 1-micrometer (after desiccation) spreading in thickness was carried out, it dried, and the following primer agent for primer stratification was used as the primer layer 12. The primer agent for primer stratification dissolved polyester resin of 40 degrees C of glass transition points, and polyol system urethane resin (the solid content weight ratio 1:1, hydroxyl value =10 mgKOH/g) in the partially aromatic solvent which consists of a methyl ethyl ketone / toluene =1:1, and adjusted A liquid. Tolylene diisocyanate and hexamethylene di-isocyanate were dissolved in the partially aromatic solvent which consists of a methyl ethyl ketone / toluene =1:1, and B liquid was adjusted. Next, it mixed, just before applying to the base material film 11 A liquid and B liquid which were adjusted above, and the primer agent was adjusted (an OH radical / NCO radical = 1/3).

[0034] Subsequently, the hot glue for heat glue line formation is adjusted. Saturation copolymerized polyester resin (the Toyobo Co., Ltd. make, crystalline polyester, trade name Byron SF 237, Tg=-5 degree C) was diluted with the partially aromatic solvent of 1 to 1 of toluene and a methyl ethyl ketone, a melamine SHIANU rate, a sulfuric-acid melamine, an aluminum hydroxide, a magnesium hydroxide, stannic-acid zinc, molybdenum oxide, triphenyl phosphate, and tricresyl phosphate were mixed at a rate shown in a table 1, and the solid content 50wt% constituent was obtained. To up to the previous primer layer 12, in the comma coating machine, it applied to 36 micrometers (at the time of desiccation) in thickness, and it dried and this was made into the heat glue line 13. subsequently, between the layer -- tinning annealed copper -- as a conductor (thickness of 50 micrometers, width of face of 0.8mm) is arranged in 17 parallel and the heat glue line of the flat cable covering material 10 of two sheets faced each other, between the metal rolls and rubber covered rolls which were heated at 150 degrees C was passed at the speed of 3 m/min, heating application of pressure was carried out, and the flat cable 1 was manufactured.

[0035] (Examples 2-19 and examples 1-16 of a comparison) About the constituent of a heat glue line, and combination, it was used by the amount used (% of the weight) which consists of a numeric value which shows in a table the ingredient shown in a following table 1 and a following table 4, and flat cable covering material 10 and a flat cable 1 were manufactured completely like the above-mentioned example 1 except it.

[0036]

[A table 1]

表 1

材料名	実施 例1	実施 例2	実施 例3	実施 例4	実施 例5	実施 例6	実施 例7	実施 例8	実施 例9	実施 例10
共重合ポリエステル	40	40	40	40	40	40	40	40	40	40
メラミンシアヌレート	54	—	—	—	—	—	—	—	—	—
硫酸メラミン	—	30	54	30	57	48	57	48	30	30
水酸化アルミニウム	6	30	6	30	—	—	—	—	—	15
水酸化マグネシウム	—	—	—	—	—	—	—	—	30	15
スズ酸亜鉛	—	—	—	—	3	12	—	—	—	—
酸化モリブデン	—	—	—	—	—	—	3	12	—	—
トリフェニールフォスフェート	—	—	—	—	—	—	—	—	—	—
トリクレジルフォスフェート	—	—	—	—	—	—	—	—	—	—
VW-1	○	○	○	○	○	○	○	○	○	○
導体接着力	60	70	80	90	70	60	80	60	60	70

[0037]

[A table 2]

表 2

材料名	実施 例11	実施 例12	実施 例13	実施 例14	実施 例15	実施 例16	実施 例17	実施 例18	実施 例19
共重合ポリエステル	40	40	40	40	40	40	40	40	40
メラミンシアヌレート	48	30	48	30	30	30	48	30	15
硫酸メラミン	—	—	—	—	—	—	—	—	15
水酸化アルミニウム	6	12	3	6	6	6	6	12	30
水酸化マグネシウム	—	—	3	6	—	—	—	—	—
スズ酸亜鉛	—	—	—	—	6	—	—	—	—
酸化モリブデン	—	—	—	—	—	6	—	—	—
トリフェニールフォスフェート	8	18	6	18	18	18	—	—	—
トリクレジルフォスフェート	—	—	—	—	—	—	6	18	—
VW-1	○	○	○	○	○	○	○	○	○
導体接着力	70	60	70	60	60	60	80	70	70

[0038]

[A table 3]



表 3

材料名	比較 例1	比較 例2	比較 例3	比較 例4	比較 例5	比較 例6	比較 例7	比較 例8
共重合ポリエステル	40	40	40	40	40	40	40	40
メラミンシアヌレート	58	—	—	—	—	—	—	—
硫酸メラミン	—	25	58	25	59	45	59	45
水酸化アルミニウム	2	35	2	35	—	—	—	—
水酸化マグネシウム	—	—	—	—	—	—	—	—
スズ酸亜鉛	—	—	—	—	1	15	—	—
酸化モリブデン	—	—	—	—	—	—	1	15
トリフェニールフォスフェート	—	—	—	—	—	—	—	—
トリクレジルフォスフェート	—	—	—	—	—	—	—	—
VW-1	×	×	×	×	×	×	×	×
導体接着力	60	50	60	50	70	70	60	40

[0039]

[A table 4]

表 4

材料名	比較 例9	比較 例10	比較 例11	比較 例12	比較 例13	比較 例14	比較 例15	比較 例16
共重合ポリエステル	40	40	40	40	40	40	40	40
メラミンシアヌレート	—	—	25	25	25	25	—	10
硫酸メラミン	25	20	—	—	—	—	57	10
水酸化アルミニウム	35	20	15	7.5	7.5	7.5	15	40
水酸化マグネシウム	—	20	—	7.5	—	—	—	—
スズ酸亜鉛	—	—	—	—	7.5	—	—	—
酸化モリブデン	—	—	—	—	—	7.5	—	—
トリフェニールフォスフェート	—	—	20	20	20	20	—	—
トリクレジルフォスフェート	—	—	—	—	—	—	20	—
VW-1	×	×	×	×	×	×	×	×
導体接着力	40	30	40	40	30	40	60	20

[0040] (Assessment) It examined and evaluated about the item shown below about the flat cable covering material 10 and the flat cable 1 of the above-mentioned examples 1-19 and the examples 1-16 of a comparison.

(1) UL VW-1 combustion test estimated the fire retardancy of the fire-resistant trial flat cable 1. Acceptance was expressed with "O", the rejected case was expressed with "x", and it wrote together in the "VW-1" column of the lower column of a table 1 thru/or a table 4.

(2) a heat glue line / conductor -- the field of the heat glue line 13 of the T character peel strength trial flat cable covering material 10 of a between, and tinning annealed copper with a thickness of 100 micrometers -- T character peel strength (g / a width of 10mm) was measured with the hauling testing machine after adhesion (for [ temperature / of 170 degrees C /, pressure / of 3kg/cm2 /, and time amount ] 3 seconds), measurement environmental temperature was measured at 25 degrees C, and the heat sealer estimated the conductor. the 180-degree exfoliating method -- measuring -- 50g or more -- acceptance -- carrying out -- the lower column of a table 1 thru/or a table 4 -- "-- a conductor -- it wrote together in the adhesive strength" column.

[0041] clearer than the result shown in the above-mentioned table -- as -- examples 1-19 -- a fire-resistant trial and a conductor -- any of adhesive strength -- although -- it was the acceptance range, and it was equal even if compared with the flat cable covering material containing a halogen series flame retardant. the examples 1-16 of a comparison -- a conductor -- fire retardancy was inadequate although there were some which pass about adhesive strength.

[0042]

[Effect of the Invention] The flat cable covering material 10 of this invention of claim 1 and claim 2 is containing the non-halogen system and the non-antimony system flame retarder, and is suitable for wiring of a computer, electronic equipment, etc. which are excellent in thermal resistance, fire retardancy, and sliding nature, and are used under the hot environment accompanying generation of heat.

[0043] Furthermore, in this invention of claim 3 thru/or claim 5, since the flame retarder of a halogen system, an antimony system, and the Lynn system is not contained, effect on an environment can be lessened more. The thing with little effect on an environment to this invention of the flat cable 1 of claim 6 using the flat cable covering material 10 of claim 1 thru/or claim 5 cannot be overemphasized.

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[Translation done.]

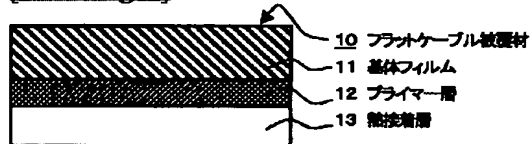
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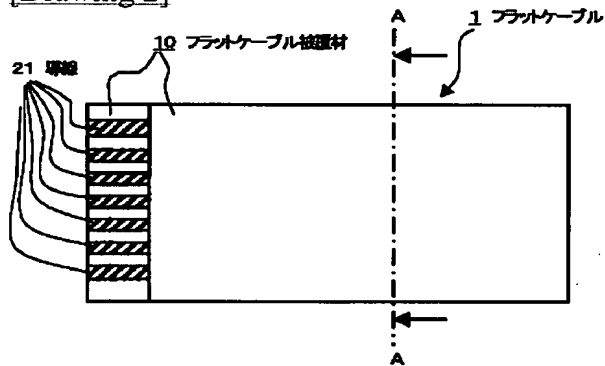
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

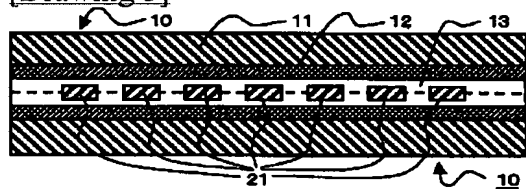
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]